

# High Availability

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Microsoft SQL Server 2000 helps maximize availability through online backups, fully integrated log shipping, and enhanced failover clustering.

## **Online Backups**

SQL Server 2000 allows data to be backed up while the database remains online and accessed by users.

With differential database backups, SQL Server 2000 includes the capability to perform differential backups. A differential backup makes a copy of all the pages in a database that have been modified since the last database backup. Using this approach, backups run relatively quickly and are smaller in size than other types of backups. Moreover, differential backups may be performed while users access the database. Because of their speed and low server impact, differential backups can be made more frequently than other types of database backups, decreasing the risk of data loss.

SQL Server 2000 includes another backup alternative, which results in a higher percentage uptime while reducing impact on resources. Server-less snapshot backups are functionally equivalent to full database or file/file group backups but can be performed with no impact on the performance of the server (hence the use of the term "server-less").

Server-less snapshot backups require the use of a third-party virtual device interface (VDI) application that can communicate directly with an advanced enterprise storage system that supports split-mirror or copy-on-write operations. A common scenario for using server-less snapshot backups would be with three-way mirroring. The VDI backup application can "break off" one of the mirrors (two mirrors continue to support users) and either back up that mirror to tape or make it available to another system. In the latter case, the backup effectively becomes an immediately available standby database. Server-less snapshot backups can be restored very quickly when brought online from a (disk-based) mirror. Not surprisingly, restorations from tape take longer.

Server-less snapshots backups offer great flexibility to organizations. Besides being a technique for initializing "warm" standby servers, they can be used to easily create reporting or test databases, with effectively no impact on production servers. SQL Server maintains the history of server-less snapshot backups, and these can be rolled forward using conventional differential and log backups.

### **Log Shipping**

Log Shipping automatically synchronizes physically separated databases by sending transaction logs from one server to another. Log Shipping can be used to provide a "warm" standby on multiple backup servers by automatically feeding transaction logs from one database to another on a continual basis. Continually backing up the transaction logs from a source database and then copying and restoring the logs to destination databases keeps the destination databases in synchronization with the source database. This can improve scalability by offloading query processing from the main machine (the source server) to read-only destination servers. Moreover, it aids reliability by providing warm standby servers.

### **Failover Clustering**

SQL Server 2000 allows failover and failback to or from another node in a cluster. Using the Windows® 2000 Advanced Server operating system in an "Active-Passive" configuration, an instance of SQL Server 2000 is run on a primary machine while a secondary instance on a second machine is idle until failover. In an "Active-Active" configuration, SQL Server 2000 runs multiple servers simultaneously with different databases, allowing for organizations with more constrained hardware requirements (that is, no designated secondary systems) to enable failover to or from any node without having to set aside hardware. In addition, with Windows 2000 Datacenter Server, SQL Server 2000 Enterprise Edition supports four-node failover clusters. When one node fails, the SQL Server and operating system resources can failover to any other surviving node.